

What is claimed is:

- 1 1. A device comprising:
2 a first particle separating channel and a second particle separating channel,
3 said second particle separating channel transverse to said first particle separating channel
4 and in communication therewith; and
5 at least two spaced apart first electrodes to maintain a first voltage, one of
6 said first electrodes disposed in either said first particle separating channel or said second
7 particle separating channel.
- 1 2. The device of claim 1 wherein at least two of said first electrodes are
2 disposed in said first particle separating channel, one of said first electrodes proximate
3 said second particle separating channel.
- 1 3. The device of claim 1 wherein one of said first electrodes is disposed in
2 said first particle separating channel and a second of said first electrodes is disposed in
3 said second particle separating channel proximate said first particle separating channel.
- 1 4. The device of claim 1 further including a third particle separating channel
2 transverse to said first particle separating channel and in communication therewith, said
3 third particle separating channel spaced apart from said second particle separating
4 channel.
- 1 5. The device of claim 4 further including an additional first electrode
2 disposed either in said third particle separating channel proximate said first particle
3 separating channel or in said first particle separating channel proximate said third particle
4 separating channel.

1 6. The device of claim 5 wherein said first electrodes are adapted to enable a
2 voltage gradient to be applied to a solution when the solution is disposed in said first
3 particle separating channel, said voltage gradient to cause charged particles within said
4 solution to migrate in said first particle separating channel.

1 7. The device of claim 1 further including a second electrode disposed in said
2 second particle separating channel to maintain a second voltage, said second voltage to
3 cause charged particles in a solution to migrate in said second particle separating channel.

1 8. The device of claim 7 further including sieving media disposed in said
2 second particle separating channel.

1 9. The device of claim 1 further including at least one reservoir disposed
2 either on an end of said first particle separating channel or on the end of said second
3 particle separating channel distal to said first particle separating channel.

1 10. The device of claim 1 further including a conductivity detector disposed in
2 said second particle separating channel, said conductivity detector including two spaced
3 apart third electrodes.

1 11. A method comprising:
2 forming a first particle separating channel and a second particle separating
3 channel, said second particle separating channel transverse to said first particle separating
4 channel and in communication therewith; and
5 disposing at least two spaced apart first electrodes in said particle
6 separating channels to maintain a first bias potential in said first particle separating
7 channel, one of said first electrodes disposed in said first particle separating channel.

1 12. The method of claim 11 wherein disposing at least two spaced apart first
2 electrodes in said particle separating channels includes disposing another of said first
3 electrodes in said second particle separating channel.

1 13. The method of claim 11 further including disposing a second electrode in
2 said second particle separating channel to maintain a second bias potential in said second
3 particle separating channel.

1 14. The method of claim 11 further including disposing sieving media in said
2 second particle separating channel.

1 15. The method of claim 11 further including coupling a reservoir to an end of
2 either said first particle separating channel or said second particle separating channel.

1 16. The method of claim 11 further including disposing a conductivity
2 detector in said second particle separating channel.

1 17. A system comprising:
2 a first particle separating channel and at least one second particle
3 separating channel, said at least one second particle separating channel transverse to said
4 first particle separating channel;
5 at least three spaced apart first electrodes to enable a voltage gradient to be
6 applied to a solution when the solution is disposed in said first particle separating
7 channel, at least one of said first electrodes disposed in either said first particle separating
8 channel or said second particle separating channel; and
9 a pump to move said solution in said first particle separating channel
10 against said voltage gradient.

1 18. The system of claim 17 further including two spaced apart second
2 electrodes disposed in said second particle separating channel to enable an electric field
3 to be applied to a solution disposed in said second particle separating channel.

1 19. The system of claim 17 further including at least one reservoir disposed at
2 an end of either said first particle separating channel or said second particle separating
3 channel such that said reservoir is in communication therewith.

1 20. The system of claim 17 wherein said system is a micro-electro-mechanical
2 system and said first particle separating channel and second particle separating channel
3 are microfluidic channels.

1 21. A method comprising:
2 applying an electric field gradient to a solution containing charged
3 particles under conditions that will cause at least some of the charged particles to focus in
4 a first channel formed in a device; and
5 without transfer, applying an electric field to the focused charged particles
6 to cause the focused charged particles to migrate through a sieve disposed in at least one
7 second channel in said device, said at least one second channel transverse to said first
8 channel and in communication therewith.

1 22. The method of claim 21 wherein applying the electric field gradient to the
2 solution containing charged particles under conditions that will cause at least some of the
3 charged particles to focus in the first channel includes causing at least some of the
4 charged particles to focus at or near said at least one second channel.

1 23. The method of claim 22 wherein applying the electric field gradient to the
2 solution containing charged particles under conditions that will cause at least some of the
3 charged particles to focus in said first channel includes establishing a convective force in
4 said solution.

1 24. The method of claim 22 wherein applying the electric field gradient to the
2 solution containing charged particles under conditions that will cause at least some of the
3 charged particles to focus in said first channel includes applying a first electric field
4 gradient and a second electric field gradient to a solution containing charged particles
5 under conditions that will cause negatively charged particles to focus in said first channel
6 in said first electric field gradient and positively charged particles to focus in said first
7 channel in said second electric field gradient.

1 25. The method of claim 24 wherein applying the first electric field gradient
2 and the second electric field gradient to the solution containing charged particles under
3 conditions that will cause negatively charged particles to focus in said first channel in
4 said first electric field gradient and positively charged particles to focus in said first
5 channel in said second electric field gradient includes causing at least some of the
6 negatively charged particles to focus at or near at least one second channel and at least
7 some of the positively charged particles to focus at or near at least another second
8 channel.

1 26. The method of claim 21 further including causing said focused charged
2 particles to be negatively charged.

1 27. The method of claim 21 wherein applying an electric field gradient
2 includes applying a linear electric field gradient.

1 28. The method of claim 21 further including detecting said charged particles
2 in said at least one second channel.

1 29. The method of claim 28 wherein detecting charged particles in said at least
2 one second channel includes detecting a change in conductivity in a region of said at least
3 one second channel.

1 30. The method of claim 21 wherein applying the electric field gradient to the
2 solution containing charged particles includes applying an electric field gradient to a
3 solution containing proteins or portions thereof.